EC 3550   MIDTERM EXAM II   5/97 Prof. Powers

- This exam is open book and notes.

- There are three problems; each is equally weighted.

- Partial credit will be given; be sure to do some work on each problem.

- Be *sure* to include units in your answers.

- Please circle or underline your answers.

- Do *NOT* do any work on this sheet.

• Show *ALL* work.

- The originals or copies of this exam and/or its solutions are not to be given or lent to anyone else.

1	
2	
3	
Total	

Name: _____

1. We want to make an InGaAsP laser that will emit at 306 THz to power an optical fiber amplifier. Calculate the fraction of each of the four constituents in the quarternary compound that are required for this source.

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2. Two step-index multimode fibers are to be joined together with connectors. Fiber #1, the emitting fiber, is a 62.5/125 fiber with a core index of 1.470 and a Δ of 1.0%. Fiber #2, the receiving fiber, is a 50/125 fiber with a core index of 1.460 and a Δ of 0.80%.

   The connectors are specified to have lateral misalignment that is 2.0% of the core diameter, a longitudinal air-filled separation between the fiber ends that is 6.0% of the core diameter, and perfect angular alignment.

   The power in the emitting fiber at the connector location is 900 μW. Calculate the power in receiving fiber *in dBm* after the connector joint.

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3. A newly made 1550-nm laser with a measured threshold current of 10 mA produces 800 μW of power (in a fiber) at a drive current of 60 mA. At the end of five years of operation, the laser power is observed to have fallen to 720 μW.

   After twenty years of operation, it will be desirable to return the operating power of the laser to 800 μW. Calculate the drive current that will be required to do this.